The First Suzuki Cross-Coupling of Aryltrimethylammonium Salts.

Simon B. Blakey and David W. C. MacMillan*

Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena, California 91125

Supporting Information

General Information. Commercial reagents were purchased from Aldrich or Strem and used as suppplied. Reactions were conducted using standard drybox techniques. Non-aqueous reagents were transferred under argon via syringe. Organic solutions were concentrated under reduced pressure on a Büchi rotary evaporator. Dioxane was distilled from sodium benzophenone ketyl and then degassed using the freeze-pump-thaw method (4 cycles) prior to use. Chromatographic purification of products was accomplished using forced-flow chromatography on ICN 60 32-64 mesh silica gel 63 according to the method of Still.[1] Thin-layer chromatography (TLC) was performed on EM Reagents 0.25 mm silica gel 60-F plates. Visualization of the developed chromatogram was performed by fluorescence quenching or iodine stain.

^{1}H and ^{13}C NMR spectra were recorded on a Varian Mercury 300 spectrometer (300 MHz and 75 MHz) as noted, and are internally referenced to residual protio solvent signals. Data for ^{1}H NMR are reported as follows: chemical shift (δ ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, br = broad), integration and coupling constant (Hz). Data for ^{13}C NMR are reported in terms of chemical shift. IR spectra were recorded on a Perkin Elmer Paragon 1000 spectrometer and are reported in terms of frequency of absorption (cm^{-1}). Mass spectra were obtained on a JEOL JMS-600H spectrometer. Melting points were recorded on a Thomas Hoover capillary melting point apparatus, and are uncorrected.

General Procedure: A *N,N,N*-trimethylanilinium trifluoromethanesulfonate (0.157 mmol), $Ni(COD)_2$ (4.3 mg, 0.0157 mmol), IMes·HCl (5.4 mg, 0.0157 mmmol), a boronic acid (1.1 or 2 equivalents) and CsF (73 mg, 0.471 mmol) were combined in a 2 dram screw-capped vial containing a magnetic stirrer bar under a nitrogen atmosphere. The vial was sealed with a cap containing a teflon coated septum, removed from the drybox and charged with dioxane (1.0

[1]Still, W. C.; Kahn, M.; Mitra, A. J. *J. Org. Chem.* **1978**, *43*, 2923.

mL). The heterogeneous mixture was heated to 80 °C and stirred for 12 h. Upon cooling to r.t., the mixture was filtered through a plug of silica, washing with ethyl acetate. The solvent was removed *in vacuo* and the residue was purified by silica gel chromatography (3–10% ethyl acetate/hexanes) to afford substituted biphenyls.

4-*n*-Butylbiphenyl (Table 1, entry 8). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and phenylboronic acid (21 mg, 0.172 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 98% yield (32.3 mg, 0.154 mmol), which had physical data identical in all respects to that previously reported.[2]

4-*n*-Butyl-2'-methylbiphenyl (Table 2, entry 1). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 2-methylphenylboronic acid (43 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 83% yield (29.9 mg, 0.130 mmol), which had physical data identical in all respects to that previously reported.[3]

4-*n*-Butyl-3'-methylbiphenyl (Table 2, entry 2). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 3-methylphenylboronic acid (43 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 89% yield (32.1 mg, 0.140 mmol). R_f = 0.64 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.51 (2H, dt, *J* = 8.2, 1.9 Hz), 7.40 (2H, br m), 7.32 (1H, td, *J* = 7.7, 1.1 Hz), 7.25 (2H, dt, *J* = 8.2, 1.7 Hz), 7.15 (1H, br d, *J* = 6.6 Hz), 2.66 (2H, t, *J* = 7.7 Hz), 2.42 (3H, s), 1.64 (2H, m), 1.39 (2H, m), 0.95 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 142.1, 141.3, 138.8, 138.4, 129.0, 128.8, 128.0, 127.9, 127.2, 124.3, 35.7, 34.0, 22.8, 22.0, 14.4; IR (film) 3023, 2956, 2927, 2857, 1607, 1588, 1566, 1515, 1484, 1465, 1340, 1377, 1119, 1095, 1018 cm^{-1}; HRMS (EI+) found 224.1560, $C_{17}H_{20}$ requires 224.1565.

4-*n*-Butyl-4'-methylbiphenyl (Table 2, entry 3). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 4-methylphenylboronic acid (43 mg, 0.314 mmol). Purification by flash chromatography (2%

[2] Rieke, R. D.; Daruwala, K. P. *J. Org. Chem.* **1988**, *53*, 2073.
[3] Dai, C.; Fu, G. C. *J. Am. Chem. Soc.* **2001**, *123*, 2719.

EtOAc/Hexanes) gave the title compound as a waxy solid in 95% yield (34.2 mg, 0.149 mmol). R_f = 0.65 (5% EtOAc/Hexanes); m.p. = 34-36 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.52 (2H, d, *J* = 8.2 Hz), 7.51 (2H, d, *J* = 8.2 Hz), 7.27 (4H, br d, *J* = 8.2 Hz), 2.67 (2H, t, *J* = 7.7 Hz), 2.42 (3H, s), 1.66 (2H, m), 1.42 (2H, m), 0.98 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.9, 138.6, 138.5, 136.9, 129.6, 129.0, 127.0, 127.0, 35.7, 34.1, 22.8, 21.5, 14.4; IR (film) 3025, 2957, 2927, 2857, 1498, 1463, 1398, 1378, 1132, 1114, 1041, 1006, 843, 806 cm^{-1}; HRMS (EI+) found 224.1567, $C_{17}H_{20}$ requires 224.1565.

4-*n*-Butyl-2'-methoxybiphenyl (Table 2, entry 4). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 2-methoxyphenylboronic acid (44 mg, 0.314 mmol). Purification by preparative TLC (5% EtOAc/Hexanes) gave the title compound as a colourless oil in 94% yield (35.3 mg, 0.148 mmol). R_f = 0.38 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.46 (2H, d, *J* = 8.2 Hz), 7.32 (2H, m), 7.24 (2H, d, *J* = 8.3 Hz), 7.02 (2H, m), 3.83 (3H, s), 2.66 (2H, t, *J* = 7.7 Hz), 1.67 (2H, m), 1.44 (2H, m), 0.97 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 156.6, 141.8 135.9, 131.0, 130.8, 129.5, 128.5, 128.3, 121.0, 111.3, 55.8, 35.8, 34.0, 22.9, 14.4; IR (film) 2999, 2956, 2929, 2871, 2856, 1598, 1582, 1516, 1487, 1463, 1456, 1436, 1407, 1378, 1298, 1261, 1239, 1180, 1162, 1122, 1056, 1030, 1006, 932, 852, 834, 794, 752 cm^{-1}; HRMS (EI+) found 240.1511, $C_{17}H_{20}O$ requires 240.1514.

4-*n*-Butyl-4'-methoxybiphenyl (Table 2, entry 5). *N,N,N*-Trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol), $Ni(COD)_2$ (4.3 mg, 0.0157 mmol), IMes·HCl (5.4 mg, 0.0157 mmmol), 4-methoxyphenylboronic acid (0.354 mmol) and K_3PO_4 (100 mg, 0.471 mmol) were combined in a 2 dram screw-capped vial containing a magnetic stirrer bar under a nitrogen atmosphere. The vial was sealed with a cap containing a teflon coated septum, removed from the drybox and charged with dioxane (1.0 mL). The heterogenous mixture was heated to 80 °C and stirred for 12 h. Upon cooling to r.t., the mixture was filtered through a plug of silica, washing with ethyl acetate. The solvent was removed *in vacuo* and the residue was purified by silica gel chromatography (3% EtOAc/Hexanes) to give the title compound as a white crystalline solid in 83% yield (31.3 mg, 0.130 mmol), which had physical data identical in all respects to that previously reported.[4]

[4] Rondeau, R. E.; Berwick, M. A.; Steppel, R. N.; Servé, R. N. *J. Am. Chem. Soc.* **1972**, *94*, 1096.

4-*n*-Butyl-2',6'-dimethoxybiphenyl (Table 2, entry 6). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 2,6-dimethoxyphenylboronic acid (58 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a white crystalline solid in 79% yield (33.4 mg, 0.124 mmol). R_f = 0.33 (5% EtOAc/Hexanes); m.p. = 59-61 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.26 (5H, m,), 6.59 (2H, dd, *J* = 8.8, 1.1 Hz), 3.74 (6H, d, *J* = 1.7 Hz), 2.66 (2H, t, *J* = 7.7 Hz), 1.67 (2H, m), 1.42 (2H, m), 0.97 (3H, t, *J* = 7.7 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 157.8, 141.4, 131.3, 130.9, 128.6, 128.0, 119.6, 104.4, 56.2, 35.9, 33.8, 23.0, 14.5; IR (film) 2999, 2956, 2930, 2870, 2856, 2835, 1589, 1517, 1471, 1432, 1408, 1282, 1245, 1172, 1109, 1038, 1004 cm^{-1}; HRMS (EI+) found 270.1617, $C_{18}H_{22}O_2$ requires 270.1620.

4-*n*-Butyl-4'-fluorobiphenyl (Table 2, entry 7). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 4-fluorophenylboronic acid (44 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a white crystalline solid in 82% yield (29.4 mg, 0.129 mmol). R_f = 0.56 (5% EtOAc/Hexanes); m.p. = 32-35 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.53 (2H, m), 7.45 (2H, d, *J* = 8.2 Hz), 7.25 (2H, d, *J* = 7.7 Hz), 7.11 (2H, t, *J* = 8.8 Hz), 2.65 (2H, t, *J* = 7.7 Hz), 1.63 (2H, m), 1.38 (2H, m), 0.94 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 162.4 (d, *J* = 248 Hz), 142.3, 137.7, 129.1, 128.7, 128.6, 127.0, 115.7 (d, *J* = 21.4 Hz), 35.6, 34.0, 22.8, 14.4; IR (film) 3026, 2959, 2930, 2874, 1739, 1605, 1498, 1466, 1395, 1379, 1303, 1265, 1235, 1159, 1126, 1099, 1047, 1008, 848, 819, 782, 738 cm^{-1}; HRMS (EI+) found 228.1314, $C_{16}H_{17}F$ requires 228.1314.

4-*n*-Butyl-3'-fluorobiphenyl (Table 2, entry 8). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 3-fluorophenylboronic acid (44 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 82% yield (29.4 mg, 0.129 mmol). R_f = 0.56 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.50 (2H, dt, *J* = 8.2, 1.9 Hz), 7.37 (2H, m), 7.28 (3H, m), 7.02 (1H, m), 2.66 (2H, t, *J* = 7.7 Hz), 1.64 (2H, m), 1.39 (2H, m), 0.95 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 163.3 (d, *J* = 245 Hz), 142.9, 130.4, 130.3, 129.1, 127.1, 122.8, 122.7, 114.0 (d, *J* = 22.0 Hz), 113.9 (d, *J* = 21.2 Hz), 35.7, 34.0, 22.8, 14.4; IR (film) 3028, 2957, 2928, 2871, 2857, 1615, 1589, 1565, 1519, 1486, 1477, 1467, 1444, 1404, 1378, 1292, 1182, 1158 cm^{-1}; HRMS (EI+) found 228.1320, $C_{16}H_{17}F$ requires 228.1314.

4-*n*-Butyl-2'-fluorobiphenyl (Table 2, entry 9). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 2-fluorophenylboronic acid (44 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 98% yield (35.0 mg, 0.154 mmol). R_f = 0.56 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.48 (2H, dd, *J* = 8.2, 1.7 Hz), 7.44 (1H, dd, *J* = 8.0, 1.9 Hz), 7.31 (1H, m), 7.29 (2H, d, *J* = 8.8 Hz), 7.20 (1H, td, *J* = 7.7, 1.6 Hz), 7.15 (1H, ddd, *J* = 10.4, 7.7, 1.7 Hz), 2.67 (2H, t, *J* = 7.7 Hz), 1.66 (2H, m), 1.41 (2H, m), 0.96 (3H, t, *J* = 7.7 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 159.9 (d, *J* = 247 Hz), 142.7, 135.2, 130.9 (d, *J* = 3.4 Hz), 129.1, 128.9 (d, *J* = 22.7 Hz), 128.9, 128.7, 124.5 (d, *J* = 3.7 Hz), 116.3 (d, *J* = 22.9 Hz), 35.8, 34.0, 22.8, 14.4; IR (film) 3027, 2957, 2998, 2871, 1613, 1582, 1520, 1485, 1466, 1452, 1410, 1378, 1252, 1214, 1107, 1042, 1009, 939, 860, 825, 757 cm^{-1}; HRMS (EI+) found 228.1322, $C_{16}H_{17}F$ requires 228.1314.

4-*n*-Butyl-4'-fluorobiphenyl (Table 2, entry 9). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 4-fluorophenylboronic acid (44 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a white crystalline solid in 82% yield (29.4 mg, 0.129 mmol). R_f = 0.56 (5% EtOAc/Hexanes); m.p. = 32-35 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.53 (2H, m), 7.45 (2H, d, *J* = 8.2 Hz), 7.25 (2H, d, *J* = 7.7 Hz), 7.11 (2H, t, *J* = 8.8 Hz), 2.65 (2H, t, *J* = 7.7 Hz), 1.63 (2H, m), 1.38 (2H, m), 0.94 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 162.4 (d, *J* = 248 Hz), 142.3, 137.7, 129.1, 128.7, 128.6, 127.0, 115.7 (d, *J* = 21.4 Hz), 35.6, 34.0, 22.8, 14.4; IR (film) 3026, 2959, 2930, 2874, 1739, 1605, 1498, 1466, 1395, 1379, 1303, 1265, 1235, 1159, 1126, 1099, 1047, 1008, 848, 819, 782, 738 cm^{-1}; HRMS (EI+) found 228.1314, $C_{16}H_{17}F$ requires 228.1314.

4-*n*-Butyl-3'-acetlybiphenyl (Table 2, entry 10). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 3-acetylphenylboronic acid (51 mg, 0.314 mmol). Purification by preparative TLC (5% EtOAc/Hexanes) gave the title compound as a colourless oil in 87% yield (34.5 mg, 0.134 mmol). R_f = 0.14 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.17 (1H, t, *J* = 1.7 Hz), 7.91, (1H, dt, *J* = 7.7, 1.7 Hz), 7.78 (1H, dt, *J* = 7.7, 1.7 Hz), 7.53 (3H, m), 7.29 (2H, d, *J* = 8.2 Hz), 2.66 (2H, t, *J* = 7.6 Hz), 2.66 (3H, s), 1.64 (2H, m), 1.39 (2H, m), 0.95 (3H, t, *J* = 7.7 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 198.3, 142.9, 141.8, 137.7, 137.6, 131.8, 129.2, 127.2, 127.1,

127.0, 35.7, 34.0, 27.2, 22.8, 14.4; IR (film) 3060, 3026, 2957, 2923, 2872, 2858, 1689, 1682, 1608, 1583, 1567, 1517, 1478, 1466, 1436, 1403, 1378, 1357, 1299, 1235, 1174, 1120, 1085, 1018, 962, 916, 840, 794, 694 cm^{-1}; HRMS (EI+) found 252.1509, $C_{18}H_{20}O$ requires 252.1514.

1-(4-Butylphenyl)-napthalene (Table 2, entry 11). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and 1-napthaleneboronic acid (54 mg, 0.314 mmol). Purification by flash chromatography (2% EtOAc/Hexanes) gave the title compound as a colourless oil in 84% yield (34.3 mg, 0.134 mmol). R_f = 0.62 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.96 (1H, t, *J* = 8.4 Hz), 7.92, (1H, d, *J* = 9.3 Hz), 7.87 (1H, d, *J* = 7.5 Hz), 7.55 (2H, m), 7.45 (4H, m), 7.33 (2H, d, *J* = 6.8 Hz), 2.74 (2H, t, *J* = 7.8 Hz), 1.73 (2H, m), 1.47 (2H, m), 1.01 (3H, t, *J* = 7.2 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 142.1, 140.5, 138.2, 134.0, 131.9, 130.1, 128.5, 128.5, 127.6, 127.1, 126.4, 126.1, 125.9, 125.6 35.8, 34.1, 22.9, 14.4; IR (film) 3045, 2956, 2927, 2857, 1592, 1514, 1505, 1465, 1458, 1438, 1396, 1378, 1337, 1248, 1205, 1186, 1161, 1116, 1021, 963, 843, 831, 797, 776 cm^{-1}; HRMS (EI+) found 260.1560, $C_{20}H_{20}$ requires 260.1565.

4'-Butylbiphenyl-3-carboxylic acid ethyl ester (Table 2, entry 12). Prepared according to the general procedure from *N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and ethyl-3-(4,4,5,5-tetramethyl-1-3-2-dioxaborolan-2-yl)benzoate (87 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 89% yield (34.3 mg, 0.134 mmol). R_f = 0.31 (5% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.27 (1H, t, *J* = 2.2 Hz), 8.00 (1H, dt, *J* = 7.7, 1.1 Hz), 7.77 (1H, dt, *J* = 7.7, 1.7 Hz), 7.55 (2H, d, *J* = 8.2 Hz), 7.49 (1H, t, *J* = 7.7 Hz), 7.27 (2H, d, *J* = 8.3 Hz), 4.41 (2H, q, *J* = 7.1 Hz), 2.66 (2H, t, *J* = 7.7 Hz), 1.63 (2H, m), 1.41 (5H, m), 0.95 (3H, t, *J* = 7.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 166.8, 142.8, 141.5, 137.7, 131.5, 131.2, 129.1, 128.9, 128.2, 128.2, 127.2, 61.4, 35.7, 34.0, 22.8, 14.8, 14.4; IR (film) 2958, 2930, 2872, 1721, 1606, 1586, 1517, 1478, 1466, 1440, 1403, 1391, 1367, 1306, 1269, 1241, 1171, 1109, 1084, 1045, 1022 cm^{-1}; HRMS (EI+) found 282.1628, $C_{19}H_{22}O_2$ requires 282.1620.

4'-(1-hexenyl)biphenyl-4-carboxylic acid methyl ester (Table 2, entry 13). 4-(Carboxylic acid methyl ester)-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol), $Ni(COD)_2$ (4.3 mg, 0.0157 mmol), IMes·HCl (5.4 mg, 0.0157 mmol) and CsF (73 mg, 0.471 mmol) were combined in a 2 dram screw-capped vial containing a magnetic stirrer bar under a nitrogen atmosphere. The vial was sealed with a cap containing a teflon coated septum,

removed from the drybox and charged with a solution of B-(*E*-1-hexenyl)-9-BBN (69 mg, 0.314 mmol) in dioxane (1.0 mL). The heterogeneous mixture was heated to 80 °C and stirred for 12 h. Upon cooling to r.t., the mixture was filtered through a plug of silica, washing with ethyl acetate. The solvent was removed *in vacuo* and the residue was purified by silica gel chromatography (5% ethyl acetate/hexanes) to afford the title compound as a colourless oil in 92% yield (31.5 mg, 0.144 mmol). R_f = 0.5 (10% EtOAc/Hexanes); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.95 (2H, d, *J* = 8.8 Hz), 7.38 (2H, d, *J* = 8.8 Hz), 6.38 (2H, m), 3.90 (3H, s), 2.22 (2H, dt, *J* = 7.1, 6.6 Hz), 1.42 (4H, m), 0.92 (3H, t, *J* = 7.2 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 167.1, 142.6, 134.4, 130.1, 129.1, 128.4, 125.9, 52.3, 33.2, 31.7, 22.7, 14.3; IR (film) 2956, 2929, 29872, 2856, 1723, 1607, 1457, 1435, 1413, 1310, 1279, 1191, 1178, 1109, 1017, 969, 867, 761 cm^{-1}; HRMS (CI+) $[M+H]^+$ found 219.1393, $C_{14}H_{19}O_2$ requires 219.1385.

2-Methylbiphenyl (Table 3, entry 1). Prepared according to the general procedure from 2-methyl-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (47 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (2% EtOAc/Hexanes) gave the title compound as a colourless oil in 89% yield (23.5 mg, 0.140 mmol), which had physical data identical in all respects to that previously reported.[5]

2-Methoxybiphenyl (Table 3, entry 2). Prepared according to the general procedure from 2-methoxy-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (50 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (5% EtOAc/Hexanes) gave the title compound as a colourless oil in 84% yield (24.3 mg, 0.132 mmol), which had physical data identical in all respects to that previously reported.[6]

3-Methoxybiphenyl (Table 3, entry 3). Prepared according to the general procedure from 3-methoxy-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (50 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (5% EtOAc/Hexanes) gave the title compound as a colourless oil in 96% yield (27.6 mg, 0.151 mmol), which had physical data identical in all respects to that previously reported.[7]

4-*n*-Butoxybiphenyl (Table 3, entry 4). Prepared according to the general procedure from 4-*n*-butoxy-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (56 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (3%

[5] Bei, X.; Turner, H. W.; Weinberg, W. H.; Guram, A. S.; Peterson, J. L. *J. Org. Chem.* **1999**, *64*, 6797.
[6] Wolfe, J. P.; Singer, R. A.; Yang, B. H.; Buchwald, S. L. *J. Am. Chem. Soc.* **1999**, *121*, 9550.

EtOAc/Hexanes) gave the title compound as a colourless oil in 85% yield (30.3 mg, 0.133 mmol), which had physical data identical in all respects to that previously reported.[8]

3,5-Dimethoxybiphenyl (Table 3, entry 5). Prepared according to the general procedure from 3,5-dimethoxy-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (50 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (6% EtOAc/Hexanes) gave the title compound as a colourless oil in 92% yield (30.9 mg, 0.144 mmol), which had physical data identical in all respects to that previously reported.[9]

Biphenyl-4-carboxylic acid methyl ester (Table 3, entry 6). Prepared according to the general procedure from 4-(carboxylic acid methyl ester)-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (5% EtOAc/Hexanes) gave the title compound as a colourless oil in 93% yield (31.0 mg, 0.146 mmol), which had physical data identical in all respects to that previously reported.[10]

Biphenyl-3-carboxylic acid methyl ester (Table 3, entry 7). Prepared according to the general procedure from 3-(carboxylic acid methyl ester)-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (54 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (5% EtOAc/Hexanes) gave the title compound as a colourless oil in 94% yield (31.3 mg, 0.148 mmol), which had physical data identical in all respects to that previously reported.[11]

3-Fluorobiphenyl (Table 3, entry 8). Prepared according to the general procedure from 3-fluoro-*N,N,N*-trimethylanilinium trifluoromethanesulfonate (48 mg, 0.157 mmol) and phenylboronic acid (38 mg, 0.314 mmol). Purification by flash chromatography (3% EtOAc/Hexanes) gave the title compound as a colourless oil in 88% yield (23.8 mg, 0.138 mmol), which had physical data identical in all respects to that previously reported.[12]

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